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IS 4191 (1967): Leather for volleyball [CHD 17: Leather, Tanning Materials and Allied Products]



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(Reaffirmed 2009)

Indian Standard

SPECIFICATION FOR LEATHER FOR VOLLEYBALL

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**INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002**



AMENDMENT NO. 1 DECEMBER 1983
TO
IS:4191-1967 SPECIFICATION FOR LEATHER
FOR VOLLEYBALL

Alteration

[*Page 5, Table 1, SI No. (i), col 3 and 4*] -
Substitute '1.5' for '1.7'.

(CDC 16)

Reprography Unit, ISI, New Delhi, India

Indian Standard

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Indian Standard

SPECIFICATION FOR LEATHER FOR VOLLEYBALL

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 25 February 1967, after the draft finalized by the Leather Sectional Committee had been approved by the Chemical Division Council.

0.2 The Sports Goods Sectional Committee of ISI, while formulating standards on sports goods as a whole, requested the Leather Sectional Committee to take up the formulation of standard on leather for sports goods. The present standard is expected to assist the tanners to offer a suitable leather to the sports goods industry and to help the Sports Goods Export Promotion Council and various quality marking schemes of state departments in selecting a material of choice controlled by the conditions of national sports or the export market needs.

0.3 It has been found by experience that by treating leather with 0.1-percent sodium trichlorophenate based on dry weight of the finished leather, it could be made effectively mildew resistant without adversely influencing the non-toxic character of the leather. Any other fungicide or a combination of fungicides which is known to be harmless to skin, in small dosages should be worked out by experiment to arrive at the optimum dosage of fungicides, so as to check the growth of mildew.

0.3.1 Extreme caution is to be exercised since the excess dosage of fungicides is harmful which often causes chafing, irritation and even dermatitis. To arrive at the optimum dosage of effective and non-toxic fungicides, the method given in Appendix A may be followed.

0.4 The requirements prescribed in this standard are based on authentic test data on indigenous samples and those received through the courtesy of the Hungarian Government. The following laboratories took part in the inter-laboratory test scheme whose technical collaboration is gratefully acknowledged:

Central Leather Research Institute, Madras;
College of Leather Technology, Calcutta; and
National Test House, Calcutta.

0.5 This standard contains clauses **4.4** and **6.1** which call for agreement between the purchaser and the supplier.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated.

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expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements, and the methods of sampling and test for chrome tanned and vegetable tanned leather for volleyball.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS: 1640-1960† shall apply.

3. TYPES

3.1 There shall be two types of leather as follows:

Type 1 Fullchrome tanned (FCT), and

Type 2 Vegetable tanned (VT).

4. REQUIREMENTS

4.1 Raw Material — The material shall be cow hides.

4.2 Tanning — The material shall be tanned by basic chromium salts, or by vegetable tanning materials, or extracts with or without the combination of syntans.

4.3 Fungicides Additives — At the end of tanning operation but before drying, suitable fungicides shall be incorporated in the leather.

4.3.1 Fungicides used to promote fungi-resistance in the leather shall be effective and non-toxic.

4.4 Finishing — The tanned leathers shall be fat liquored or oiled or both. The material shall be dyed red, green, cream or any other colour as desired by the purchaser, which shall be clearly stated while ordering.

4.5 Physical Requirements — The leather shall also comply with the physical requirements given in Table 1.

4.6 Chemical Requirements — The material shall comply with the chemical requirements calculated on 14 percent moisture basis, given in Table 2.

*Rules for rounding off numerical values (*revised*).

†Glossary of terms relating to hides, skins and leather.

TABLE 1 PHYSICAL REQUIREMENTS FOR LEATHER FOR VOLLEYBALL

(Clause 4.5)

SL No.	CHARACTERISTIC	REQUIREMENTS		METHOD OF TEST REF TO	
		Chrome Tanned Leather	Vegetable Tanned Leather	Cl No. in IS: 582- 1954*	Appendix
(1)	(2)	(3)	(4)	(5)	(6)
i)	Thickness mm, <i>Min</i>	1.7	1.7	20	—
ii)	Water absorption, percent by weight, <i>Max</i>				
	a) in $\frac{1}{2}$ hour	25	40 } 55 }	21	—
	b) in 2 hours	30			
	c) in 24 hours	35			
iii)	Cracking strength	Grain shall not crack		22	—
iv)	Tensile strength, kg/cm ² , <i>Min</i>	200	200	23	—
v)	Elongation at break, percent, <i>Max</i>	55	55	23	—
vi)	Stitchtear strength (double hole), kg/cm thickness, <i>Min</i>	60	60	—	B
vii)	Shrinkage temperature, °C, <i>Min</i>	95	77	—	C

*Methods of sampling and test for vegetable and chrome tanned leathers.

TABLE 2 CHEMICAL REQUIREMENTS FOR LEATHER FOR VOLLEYBALL

(Clause 4.6)

SL No.	CHARACTERISTIC	REQUIREMENTS		METHOD OF TEST (REF TO IS: 582-1954*)
		Type 1	Type 2	
(1)	(2)	(3)	(4)	(5)
i)	Total ash, percent by weight, <i>Max</i>	—	1.5	7
ii)	Oils and fats, percent by weight	2.5, <i>Min</i>	3.0 to 8.0	8
iii)	Chromium content (as Cr ₂ O ₃) percent by weight, <i>Min</i>	3.0	—	9
iv)	Water solubles, percent by weight, <i>Max</i>	—	15.0	10
v)	Soluble ash, percent by weight, <i>Max</i>	—	1.0	11
vi)	Insoluble ash, percent by weight, <i>Min</i>	—	0.5	12
vii)	pH of water solubles, <i>Min</i>	3.2	3.6	13
viii)	Differential number, <i>Max</i>	—	0.6	13
ix)	Degree of tannage, <i>Min</i>	—	50.0	17

*Methods of sampling and test for vegetable and chrome tanned leathers.

4.7 Mildew Resistance — The material shall not support mould growth.

4.7.1 The material shall show no growth of mildew when examined visually, after the completion of the test prescribed in Appendix D.

5. MARKING

5.1 The leather pieces or packages, or both, shall be marked with area in square decimetres and weight in kilograms, the name of the manufacturer, and recognized trade-mark, and type, month, and year of manufacture.

5.2 The leather pieces or packages, or both, may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules And Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

6. PACKING AND PACKAGING

6.1 The leather pieces shall be packed as agreed to between the purchaser and the supplier.

7. SAMPLING AND CRITERIA FOR CONFORMITY

7.1 Scale of Sampling — Samples for ascertaining conformity of the material shall be drawn in accordance with the procedure prescribed in IS : 582-1954*.

7.3 Postition of Sampling

7.24 Sampling Position for Chemical Tests — Sampling position for chemical tests shall be as prescribed in IS: 582-1954*.

7 2 2 Sampling Position for Physical Tests — Sampling position for physical tests shall be as prescribed in Appendix E.

7.3 Examination for Visual Requirements — All the pieces in the sample selected from a lot shall be individually examined for visual requirements regarding the finishing of leather. If any piece is found to be defective, the entire lot shall be screened in respect of the visual requirements in order to remove all the defective pieces from the lot.

*Method of sampling and test for vegetable and chrome tanned leathers.

7.4 Tests for Physical Requirements — Each piece in the sample shall be tested for all the physical requirements individually. The lot shall be considered to have met the physical requirements if each piece individually satisfies everyone of these requirements; otherwise the lot shall be rejected without further testing.

7.5 Tests for Chemical and Resistance to Mould Growth Requirements — If the lot has been found satisfactory in respect of physical requirements, it shall be subjected to the tests of all other requirements of this specification. The lot shall be declared to have met the requirements of this specification if all the test results, obtained by following the specified testing procedure, satisfy the relevant requirements of this specification.

8. TEST METHODS

8.1 Physical and chemical tests shall be carried out as prescribed in col 5 and col 6 of Tables 1 and 2 respectively.

8.2 Standard Atmospheric Conditions for Physical Tests

8.2.1 The test specimens shall be conditioned to a moisture equilibrium in an atmosphere of 65 ± 2 percent RH and at $27^\circ \pm 2^\circ\text{C}$ (see IS: 196-1966* and, if possible, tested in that atmosphere or soon after removal from that atmosphere.

8.3 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (see IS: 1070-1960†) shall be used in the tests.

Note — 'Pure chemicals' shall mean the chemicals that do not contain impurities which affect the test results.

APPENDIX A

(Clause 0.3.1)

METHOD TO DETERMINE OPTIMUM DOSAGE OF FUNGICIDES IN TREATING LEATHERS

A-1. PROCEDURE

A-1.1 Treat 50-mm square specimen successively with a standard spore suspension and observe the growth of mildew, in accordance with the method prescribed in Appendix D. At the end of the prescribed period,

*Atmospheric conditions for testing (*revised*).

†Specification for water, distilled quality (*revised*).

the sample may have vigorous, moderate, slight or very slight, or nil growth of mildew as defined below:

Vigorous — entire surface of leather covered with mildew in test period.

Moderate — three-fourth surface of leather covered with mildew in test period.

Slight — half of the surface of leather covered with mildew in test period.

Very Slight — one-fourth surface of leather covered with mildew in test period.

Nil — no growth of mildew.

A-1.2 Treat the leather with fungicides to such an extent that no growth of mildew is just observed on the leather. The efficiency of the fungicide treatment is best judged by the performance of the treated leather following the procedure in **A-1.1** when subjected to mildew growth test and improvement made till no growth is obtained.

APPENDIX B

[Table 1, Item (vi)]

DOUBLE HOLE STITCHTEAR STRENGTH

B-1. SCOPE

B-1.1 This method is intended for determining the stitchtear strength of the leather using a double hole test.

B.2. APPARATUS

B-2.1 Metal Wire — A piece of soft metal wire 1 ± 0.025 mm in diameter and not less than 100 mm in length.

B-2.2 Means to Make Double Hole — A punch or other instrument for making a 2-mm hole in the specimen.

B-2.3 Testing Machine — The testing machine is similar to the machine used for testing tensile strength prescribed in IS:582-1954* except that the jaws of the grips of the machine shall be covered with a material

*Methods of sampling and test for vegetable and clirome tanned leathers.

suitable for protecting the gripping surface from damage by contact with metal wire.

B-3. TEST PIECE

B-3.1 The test piece shall be rectangular 50×25 mm, cut from the test unit of leather.

B-4. PROCEDURE

B-4.1 The test piece shall be free from mechanical damage and defects. Punch two holes each 2 mm in diameter as shown in Fig. 1. Make the metal wire into U-shape and pass through the two holes so that both ends project from the flesh side of the test piece. Clamp the ends of the wire in the wrapped grips of the testing machine. Grip the free end of the test piece in the other grip of the machine described in **B-2.3**. Apply force to the test piece at such a rate that the actuated grip travels at a uniform speed of 25 ± 5 cm/min. Note the force required to tear the test piece at the moment of the initial tear of the test piece.

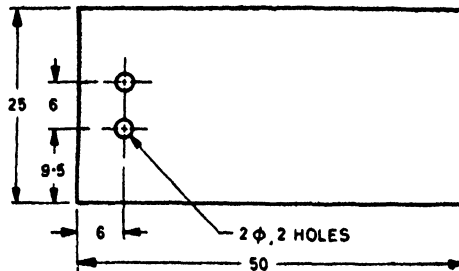


FIG. 1 DIMENSIONS OF TEST PIECE

B.5. RESULTS

B-5.1 Test one test piece from each of the samples.

B-5.2 Average the test results obtained from the test pieces tested for the double hole tear strength and calculate the strength in kilograms per centimetre thickness of the sample.

B-5.3 Record the double hole tear strength of the sample to the nearest 0.5 kg.

APPENDIX C

[Table 1, Item (vii)]

TEST FOR SHRINKAGE TEMPERATURE

C-0. PRINCIPLE

C-0.1 The thermal stability of the leather depends on the nature and extent of tannage and consequently shrinkage temperature is a direct measure of the same.

C-1. APPARATUS

C-1.1 The apparatus consists of the following essential parts.

C-1.1.1 *Beaker* — one litre capacity.

C-1.1.2 *Clamps* — two suitable clamps to hold the specimen. The upper clamp shall be capable of moving and lower clamp shall be stationary.

C-1.1.3 *Heating Device*

C-1.1.4 *Indicating Device* — An indicating device which keep the test pieces in position and accurately detects and magnifies by at least 25 times any shrinkage or swelling of the test piece. In no case the device shall cause an elongation of more than 10 percent of the test piece prior to shrinkage.

C-1.1.5 *Stirrer* — a suitable mechanical stirrer.

C-1.1.6 *Thermometer* — a suitable thermometer reading up to 150°C.

C-2. PROCEDURE

C-2.1 Preparation of Test Piece — Cut from the relevant portion (see 7.2.2) a test piece 10 × 60 mm.

NOTE — Degrease the sample with petroleum ether for 24 hours at room-temperature, free it from solvent and then proceed with the experiment.

C-2.2 Mount the clamps one over the other 50 mm apart, with the bottom one stationary. Attach the indicating device to the upper (movable) clamp. Place the test piece in the clamps, completely immerse in the water at $27^{\circ} \pm 2^{\circ}\text{C}$ and allow it to remain until the water has thoroughly penetrated the test piece. Adjust the indicator to a reference (or zero) point so that the eventual shrinkage can be readily detected. Stir the water while being heated at a rate of 3° to $5^{\circ}\text{C}/\text{min}$. As the temperature rises, swelling of the test piece may occur. If this happens, again adjust the indicator to a reference or zero point. Record the temperature of the water at which the test piece begins to shrink.

APPENDIX D

(Clause 4.7)

TEST FOR MILDEW RESISTANCE

D-1. OUTLINE OF THE METHOD

D-1.1 Untreated leathers as well as leathers treated with agents to promote mould resistance are smeared, sprayed or swabbed with mixed spore suspension of species of mould given in **D-4.1** and the resistance of such leathers to the growth of moulds is evaluated.

D-1.2 Conditions prescribed for sampling in this test method correspond to those to which the leathers are subjected in use and normal storage.

D-2. TEST PIECES

D-2.1 The test pieces shall be treated as follows.

D-2.1.1 The test pieces from first sample *A* are kept for 7 days at $45^{\circ} \pm 2^{\circ}\text{C}$ in an oven with forced air circulation and leached by drumming for 3 hours in about 30 times their weight of water at $27^{\circ} \pm 2^{\circ}\text{C}$ (see IS: 196-1966*). The leached test pieces are then drained and blotted.

D-2.1.2 The test piece from second sample *B* is tested as received.

D-3. APPARATUS

D-3.1 Containers for Keeping Test Pieces — Any suitable glassware which can be conveniently stoppered, namely, jars, desiccators or glass tanks with greased covers to preclude loss of water vapour during the test may be used. The vessel may contain water at the bottom or cotton wool or clean sand previously saturated with boiling water. This is done to obtain 100 percent RH at approximately 30°C .

NOTE — The same vessel shall not be used for simultaneous testing of test pieces treated with different fungicides.

D-3.2 Incubator — one capable of maintaining $45^{\circ} \pm 2^{\circ}\text{C}$ with forced air circulation and another capable of maintaining $30^{\circ} \pm 2^{\circ}\text{C}$.

D-4. REAGENTS

D-4.1 Standard Mixed Spore Suspension — Standard mixed spore sand suspension of the following culture of species of moulds are to be

*Atmospheric conditions for testing (*revised*).

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used in the test:

Asperigillus niger
Asperigillus flavus
Asperigillus terreus
Asperigillus nidulans
Paecilomyces varioti
Penicillium frequentans

D-4.1.1 With each batch of such a suspension a list showing the organisms incorporated therein as well as the date prior to which the culture is to be used shall be furnished.

NOTE — At present, only sand spore suspension of species of mould, usually found in tanned leathers, are supplied by the Central Leather Research Institute, Madras.

D-5. PROCEDURE

D-5.1 Cut 4 strips of 50 × 10 mm from the treated test pieces (*see* **D-2**), dampen with sufficient water for about 5 minutes, smear, spray or swab with mixed spore suspension and then suspend them above a free water surface in a suitable covered vessel as described under **D-3.1**.

D-5.2 Viability Control — Simultaneously, tests shall be carried out with test pieces from control samples of leather not treated with fungicides. If this untreated material fails to show any abundant growth of the test organism, the test shall be considered inconclusive and shall be repeated.

D-5.3 Incubation — Incubate the test pieces for 30 days at 30° ± 2°C and 95 to 100 percent RH in the incubator (*see* **D-3.2**), or the relative-humidity cabinet, kept in the dark

D-5.4 The test pieces shall be examined at frequent intervals, at least once a week and the date of the first appearance of mould growth shall be noted.

D-6. ASSESSMENT OF RESISTANCE TO MOULD ATTACK

D-6.1 Presence or absence of mould growth as well as the extent of growth at the end of the incubation period may be assessed visually and indicated in the test report as vigorous, moderate, slight, very slight or nil (*see* **A-1.1**).

D-6.2 The test report shall also state the following:

- a) The number of samples tested;
- b) Nature of the samples tested, (A) or (B) (*see* **D-2.1.1** and **D-2.1.2**);
- c) The date of incubation; and
- d) The date of first appearance of mould growth.

APPENDIX E

(Clause 7.2.2)

SAMPLING POSITION FOR PHYSICAL TESTS

E-1. LOCATION OF PIECES FOR PHYSICAL TESTS

E-1.1 The location shall be selected from the material in the manner described in E-1.1.1 and Fig. 2.

E-1.1.1 A cow hide is represented in Fig. 2 with the head portion removed. *B* is the root of the tail, *C* is the farthest point on the backbone at the neck portion, *A* is a point on the backbone such that $AC = 2AB$. *AD* is a line perpendicular to *BC*. *F* is the mid-point of *AD* and *AE* is

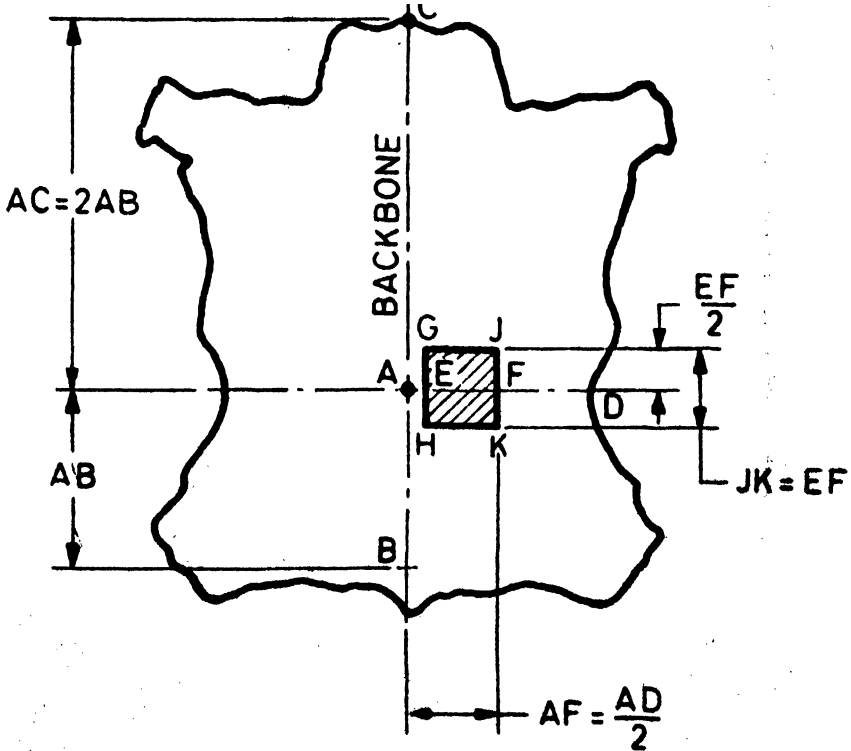


FIG. 2 SAMPLE LOCATION

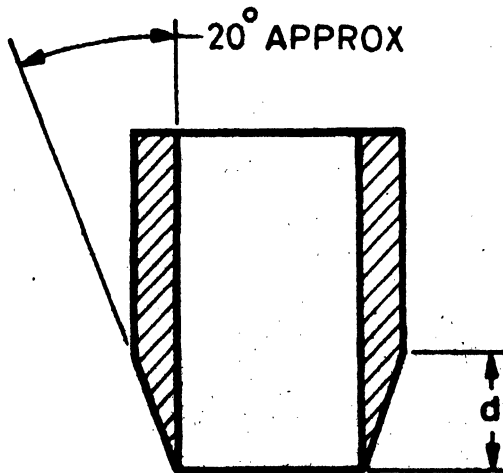
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50 mm long. The lines GH and JK , whose mid-points are E and F respectively, are parallel to BC and each of length equal to EF .

B-1.1.2 The pieces for physical tests shall be cut from the square $HKJG$.

E-2. SAMPLE CUTTING BY PRESS KNIFE

E-2.1 Press Knife — The internal surfaces of each press knife shall be normal to the plane which contains the cutting edge. The angle formed at the cutting edge between the internal and external surfaces of the press knife shall be approximately 20° and the wedge of this angle shall be of a depth exceeding the thickness of leather (see Fig. 3).



d = DEPTH OF THE WEDGE

FIG. 3 SHAPE OF PRESS KNIFE

E-2.2 Method of Cutting Sample — In cutting the samples, the knife shall be applied to the grain surface. To obtain clean-cut sample pieces for physical tests, the press knife used shall be sharp. It is advantageous to place a thick sheet of paper between the sample and the cutting board.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	U N I T	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Unit

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	Pascal	Pa	1 Pa = 1 N/m ²

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